PSU3

SAVINGS OF THE USE OF RHBMP-2 IN OPEN TIBIA FRACTURES FOR EUROPEAN HEALTH CARE SYSTEMS FROM A PAYER AND SOCIETAL PERSPECTIVE

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OBJECTIVES: Recombinant human bone morphogenetic protein (rhBMP2) is a growth factor for new bone formation. The objective was to calculate cost savings for the use of rhBMP-2 in grade III open tibia fractures for Germany, France and UK from a public health care system and a societal perspective, respectively. **METHODS:** A health economic model was developed based on clinical data from a previously published randomized controlled trial (BESTT study) comparing rhBMP-2 + standard of care (soft tissue management and intramedullary nailing) with standard of care alone. Clinical data were transferred using reimbursement 2005 tariffs (German-DRG, UK-NHS, French-Social Security tariffs) and published data for sickness payments and productivity loss for a one year time horizon. **RESULTS:** In Germany and France sickness payments are provided by public health care insurances and therefore, the payer perspective is identical to the societal perspective. In Germany, the use of rhBMP-2 for grade III open tibia fractures savings of direct costs of 1359 € per patient and of 2714 € for sickness payment resulting in total savings of 4073 € per patient that offset the price of rhBMP2 (2950 €). For France, there are total savings of 3476 € with savings in direct costs of 1197 € and in indirect costs of 2279 € which outbalance the price of rhBMP-2. For UK, rhBMP-2 achieves savings of ≤1126 from a payer perspective which is below price of rhBMP-2 (≤1790). However, from a UK societal perspective total savings of ≤5139 make rhBMP-2 a cost saving strategy. For all three different countries the major driver for cost savings is the faster fracture healing with reduced expenses for sickness leave payments and productivity gain, respectively. **CONCLUSION:** rhBMP-2 is a cost saving strategy in grade III open tibia fractures from a payer perspective for Germany and France and from a societal perspective for UK.

METHODS & CONCEPTS

PMC1

FORECASTING WITH TIME SERIES MODELS TO EXAMINE THE AVAILABILITY OF INPATIENT BEDS

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OBJECTIVES: To examine the relationship of admissions to discharges in the availability of inpatient beds at a medium sized southern hospital. **METHODS:** Data collected from several EDs were modeled using time series analysis to investigate the relationship of time of admission to length of stay; in addition, discharge data were collected to examine the time between admission and discharge to see if the time lag is related to bed availability. **RESULTS:** In the emergency department (ED) where arrivals can occur randomly, the peak time is between 9AM and 5PM in one hospital, increasing the length of stay for non-urgent patients while patients admitted to inpatient beds have considerable variability in their stay in the ED. At a second hospital, the peak time occurred at 3PM during the standard time of shift change. In addition, there is a time lag in beds, with admissions trailing discharges. **CONCLUSION:** Time series forecasting can find problems in the availability of beds; once identified, the problems can be solved. These time series techniques can be used to drill down into every 24-hour period to examine where increased waiting times result for bed unavailability.

PMC2

THE EFFECT OF PHARMACIST CONSULTATION ON PATIENT MEDICATION ADHERENCE: AN INSTRUMENTAL VARIABLE APPROACH

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OBJECTIVES: To assess the effectiveness of pharmacist consultation service in increasing patient medication adherence by applying the instrumental variable (IV) method to adjust for endogeneity. **METHODS:** This study used the Kaiser Permanente (KP) pharmacist consultation intervention survey data from 1993 to 1995. The effect of pharmacist consultation on medication adherence was measured via patients' satisfaction with the service using patient ratings. Treating this variable as exogenous, a single-equation probit model was used. To address the endogeneity, bivariate probit models were employed using different sets of instrumental variables (IVs). The IVs used were measures of patients' optimism, as well as the business of a KP pharmacy by measuring the amount of prescriptions filled at non-KP pharmacies. Smith-Blundell test was used to test the endogeneity. Over-identification tests were used to test the validity of the IVs. The weak instrument test was used to evaluate the IVs' explanatory powers. **RESULTS:** All tests indicated that the IVs used were valid and the results were significant. The single-equation probit model renders that patients' satisfaction with pharmacist consultation has significant effect on medication adherence ($p < 0.0001$). The bivariate probit models using different sets of IVs exhibit that the single-equation probit model underestimated the magnitude of the effect because of the endogeneity bias; the marginal effect of patients' satisfaction with pharmacist consultation on medication adherence increased from 0.06 to about 0.27 after using bivariate probit models ($p < 0.0001$). In other words, once the endogeneity bias was corrected, pharmacist consultation demonstrated a greater impact on patient medication adherence. **CONCLUSION:** Pharmacist consultation plays a significant role in health care. Its effect can be evaluated on patient medication adherence via patient satisfaction with the service. This study reveals that the effect of this service was significant before addressing the endogeneity and, the magnitude of the effect increased after the endogeneity was removed.

PMC4

DEVELOPING NATIONS AND COST-EFFECTIVENESS: THE METHODS MATTER

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OBJECTIVES: Examine the impact of adjusting for price differences (conversion to international dollars), as advocated by the World Health Organization (WHO), when conducting cost-effectiveness analyses in developing nations. **METHODS:** We created a hypothetical cost-effectiveness analysis, set in India, with 2 strategies: standard care (STD-CARE) and intervention. Two costing methods were used: unadjusted exchange rate (XCHG), and international dollars (I$) where non-traded goods (e.g. services or locally traded goods) and per-capita gross domestic product (GDP) were adjusted for international price differences using purchasing power parity (PPP) estimates from WHO. Three different interventions were considered: 1) Costs are all internationally traded goods (TRADED); 2) Costs are all

non-traded goods (NON-TRADED); and 3) Costs evenly split between traded and non-traded goods (MIX). STD-CARE costs freely varied from 0–100% traded goods. GDP was about $600 using the exchange rate, I$1865 using PPP. The outcome measure was the incremental cost-effectiveness ratio stated as multiples of GDPs/DALY (Disability-adjusted Life Year). We considered the commonly used threshold of 1GDP, as well as WHO recommendations: ≤1GDP "very cost-effective", 1–3GDP "cost-effective". Parameters were chosen to achieve an ICER of 4GDP for XCHG. **RESULTS:** By definition, the ICER is constant (4GDP) for XCHG. For NON-TRADED using $I, the ICER was ≥4GDP in all cases. For TRADED using I$, the ICER was <1 when <79% of STD-CARE costs were traded goods. For MIX using I$, ICERs were never below 1GDP, but were below 3GDP when <76% of STD-CARE costs were traded goods. **CONCLUSION:** Adjusting prices using purchasing power parity (I$'s) as opposed to the unadjusted official exchange rate can dramatically alter conclusions when comparing interventions involving different proportions of traded goods. In particular, an intervention with costs primarily from traded goods (e.g. vaccination) may be clearly *not* cost-effective using the exchange rate, yet appear very cost-effective after adjusting for purchasing power parity.

PMC5

EVALUATING AN ONLINE CALCULATOR FOR ANALYZING INCREMENTAL NET BENEFIT AND THE EXPECTED VALUE OF PERFECT INFORMATION FROM PATIENT LEVEL DATA

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OBJECTIVES: To evaluate an online calculator for analyzing incremental net benefit and expected value of perfect information. **METHODS:** An online calculator was developed that generates incremental net benefit (INB) and expected value of perfect information (EVPI) statistics and graphs from patient level cost and effectiveness data and is freely available at http://www.HealthStrategy.com. The calculator was compared to two other software options: Obenchain's ICEplane software which can be downloaded from http://www.math.iupui.edu/~indyasa/bobdown.htm and an MS Excel module developed by Nixon, Wonderling and Grieve, and downloadable through http://www.mrc-bsu.cam.ac.uk. For the comparison, three datasets were utilized from published studies dealing with fluoxetine (FLUX), a randomized test dataset (RND), and acupuncture (ACCU). **RESULTS:** INB values on the three datasets at various lambda threshold values (WTP) between HealthStrategy, ICEplane and Nixon were as follows: ACCU (WTP at mean ICER, 10088): 2.0 vs 2.7 vs 2.0; RND (WTP at 1.0): 2.0 vs 2.4 vs 2.0; and FLUX (WTP at 1742): 57472 vs 56570 vs 56979. ICEplane does not calculate EVPI, but the Nixon module was adapted by adding a column for the estimation of the unit normal loss integral as documented by Griffin and Chilcott. The respective HealthStrategy and Nixon module EVPI values for each dataset were as follows: ACCU (WTP at mean ICER): 67.9 vs 66.7; RND (WTP at 0.0): 0.167 vs 0.105; and FLUX (WTP at 0.0): 169.8 vs 169.8. **CONCLUSION:** All three software provide basic statistics and graphs including scatter plots, confidence intervals and acceptability curves. For INB and EVPI, the HealthStrategy and Nixon packages use parametric calculations requiring assumptions not always met with cost effectiveness data. For future research, more comprehensive software should be added to this comparison like Stata, the R statistical package and Winbugs, along with consideration of population EVPI and expected value of sample information (EVSI).

PMC6

A COST-EFFECTIVENESS STUDY OF TRANSPORTING PERSONS WITHOUT MEDICAL NEEDS BY AMBULANCE. A PROSPECTIVE STUDY OF AMBULANCE SERVICE IN SWEDEN

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OBJECTIVES: Overuse of emergency services and overcrowding of A&E departments is a major problem. Many patients suffering from minor illness or injuries often call the emergency dispatch centre requesting an ambulance for transport to a hospital, where this is included in the welfare package as in most OECD countries. The aim of this study was to analyze the characteristics of patients transported by ambulance, and assess the appropriateness related to age, sex, diagnoses, and urban or rural areas respectively. **METHODS:** This study was prospective, cross sectional in urban and rural districts in Sweden. Assessments made by the emergency medical dispatch operators for 1977 consecutive users of ambulance, were reviewed and evaluated by the ambulance staffs on the scene at the end of the pre-hospital care. **RESULTS:** Assessment made by the ambulance staff indicated that a majority of people transported by the ambulance service had no medical needs for prehospital interventions. There was a substantial safety margin in the priority assessments. Only ten percent had potentially life threatening conditions. In urban areas one third of the patients for whom an ambulance were assigned did not need the ambulance service. Several of these were ordered by hospital staff for transportation of elderly patients to other providers. In the more sparsely populated areas the medical status of the patients generally was more severe, more medical treatment was given in the ambulances, and the ambulances was more frequently judged as the appropriate mode of transport in these regions. **CONCLUSION:** Due to the safety aspects, there is an overuse of ambulance services increasing the need for back-up vehicles. This means that there are no marginal costs, while the marginal utility is decreasing. For this we have a formula.

PMC7

A PRE-POST TIME IN MOTION METHODOLOGY TO EXAMINE PRODUCT WASTAGE REDUCTION: PILOT RESULTS IN MAGNETIC RESONANCE CONTRAST MEDIA PHARMACY BULK PACK

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OBJECTIVES: To demonstrate the applicability of time in motion methodology in detecting difference in MR contrast media wastage and the potential costs savings of magnetic resonance (MR) contrast media Pharmacy Bulk Pack (PBP) use. **METHODS:** Time in motion methodology has been demonstrated as an effective tool in highlighting efficiencies in process-oriented tasks and increasingly used in health care to measure efficiency. We designed a prospective, time in motion study to examine the pre and post use of MR contrast media PBPs. Seven MR imaging centers collected 30 continuous observations (for approximately 2 weeks). During the pre period, data were collected via a quantitative Case Report Form on the time and number of MR procedures, patient weight, body part scanned, contrast media details (volume used, packages opened, volume discarded), and total scan time. MR center-specific contrast media usage algorithms, which incorporated gadopentetate dimeglumine PBP, were developed based on data collected in the pre-period to enhance efficiency and reduce wastage, and were